[5822]-414

S.Y. B.Sc.

STATISTICS

ST - 241 : Tests of Significance and Statistical Methods

(2019 Pattern) (Semester - IV) (Credit System) (24171) (Regular)

(Paper - I)

Time : 2 Hours] [*Max. Marks : 35*

Instructions to the candidates:
1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*
3) *Use of calculator and statistical table is allowed.*

Q1) Attempt each of the following:

A) In each of the following case choose the correct alternative: **[1 each]**

a) Type I error is _____.

i) accepting H_0 where is false

ii) rejecting H_0 when it is false

iii) accepting H_0 when it is true

iv) rejecting H_0 when it is true

b) The range in which multiple correlation coefficient lies is _____.

i) –1 to 1

ii) 0 to 1

iii) $-\infty$ to ∞

iv) 0 to ∞

c) Expected waiting time of customers in the queue in case of M/M/1 model is _____.

i) $1 - \dfrac{\lambda}{\mu}$

ii) $\dfrac{1}{\mu - \lambda}$

iii) $\dfrac{\lambda}{\mu - \lambda}$

iv) $\dfrac{\lambda}{\mu(\mu - \lambda)}$

B) In each of the following state whether the given statement is true or false: **[1 each]**

a) The rates of vital events are measured in per million.

b) Critical region is a region of rejection null hypothesis.

Q2) Attempt any two of the following: **[5 each]**

a) Explain the terms :

   i) P - value

   ii) Confidence interval

   iii) Statistics

b) Show that $R_{1.23}^2 = b_{12.3}r_{12}\dfrac{\sigma_2}{\sigma_1} + b_{13.2}r_{13}\dfrac{\sigma_3}{\sigma_1} + b_{13.2}r_{13}\dfrac{\sigma_3}{\sigma_1}$.

c) Explain the methods of collecting vital statistics.

Q3) Attempt any two of the following: **[5 each]**

a) A sample of 800 ball bearings is found to have average weight of 12.5 grams. Can we assume that a sample is coming from a population with mean 13 grams against that it is less than 13 grams? (Assume that the population standard deviation is 1 gram).

b) Show that a multiple correlation coefficient cannot be negative.

c) One customer arrives at a counter in a bank after every 15 minutes. Staff on the counter take 10 minutes on an average for serving a customer. Under the assumptions for applying M/M/1 : ∞ /FCFS model, Find:

   i) Average queue length.

   ii) A second counter will be started if waiting time of customer in the queue is at least 15 minutes. Can you justify a need of second counter?

Q4) Attempt any one of the following.

    a)   i)   Derive the equation of regression plane of Y on X_1 and X_2.   **[7]**

        ii)   Define: **[3]**

            1)   Crude Death Rate (CDR)

            2)   Crude Birth Rate (CBR)

            3)   Standardized Death Rate (S.T.D.R.)

    b)   i)   A manufacture of ball - bearing guarantees that 2% of items are defective. A sample of 1000 ball bearings gave 25 defective, can we say the product meets guarantee?   **[5]**

        ii)   Calculate G.R.R. and N.R.R. for the following data and interpret.**[5]**

Age - Group	15-19	20-24	25-29	30-34	35-39	40-44
No. of woman	16,000	15,000	16,500	14,000	16,000	12,000
Femal births	160	225	330	210	144	90
Mortality rate	0.09	0.10	0.11	0.12	0.13	0.14

✈ ✈ ✈